Entergy

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Fred Dacimo
Site Vice President
Administration

August 9, 2005
Indian Point Unit No. 3
Docket Nos. 50-286
NL-05-090

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: Licensee Event Report # 2005-004-00, "Manual Reactor Trip Due to a Service Water Leak Inside the Main Generator Exciter Enclosure Caused by Exciter Cooler Gasket Leaks"

Dear Sir:

The attached Licensee Event Report (LER) 2005-004-00 is the follow-up written report submitted in accordance with 10 CFR 50.73. This event is of the type defined in 10 CFR 50.73(a)(2)(iv)(A) for an event recorded in the Entergy corrective action process as Condition Report CR-IP3-2005-03054.

There are no commitments contained in this letter. Should you or your staff have any questions regarding this matter, please contact Mr. Patric W. Conroy, Manager, Licensing, Indian Point Energy Center at (914) 734-6668.

Sincerely,

for

Fred R. Dacimo
Site Vice President
Indian Point Energy Center

IE22

Attachment: LER-2005-004-00

cc:

Mr. Samuel J. Collins
Regional Administrator – Region I
U.S. Nuclear Regulatory Commission

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Resident Inspector Indian Point Unit 3

Mr. Paul Eddy
State of New York Public Service Commission

INPO Record Center

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to Infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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4. TITLE Manual Reactor Trip Due to a Service Water Leak Inside the Main Generator Exciter Enclosure Caused by Exciter Cooler Gasket Leaks

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV. NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
06	10	2005	2005 -	004 -	00	08	09	05	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

1

10. POWER LEVEL

100%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(A)(2)(I)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER *(Include Area Code)*
Dennis Cowell, Maintenance Technical Specialist	(914) 736-8624

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
D	KG	HX	W120	N					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

16. ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced type written lines)*

On June 10, 2005, at approximately 0924 hours, operations initiated a manual reactor trip following discovery of service water (SW) leakage inside the main generator exciter enclosure. All control rods fully inserted and all required safety systems functioned properly. The plant was stabilized in hot standby with decay heat being removed by the main condenser. There was no radiation release. The Emergency Diesel Generators did not start as offsite power remained available. The Auxiliary Feedwater System automatically started as expected due to Steam Generator shrink effect. The cause of the leakage was a split gasket on the 32B exciter cooler due to over tightened heat exchanger head bolting. The root cause of the condition was the level and extent of training associated with resilient gasketed joint installation which does not encompass the effects of an improper tightening sequence encountered during the return to service test phase. Corrective actions included repair/replacement of applicable exciter cooler gaskets, leak inspections, counseling maintenance personnel on management's expectation on questioning attitude, self checking, use of the formal work process, and workmanship quality. Applicable heat exchanger maintenance procedures and training program will be reviewed and revised as necessary for proper gasket application/material and proper cooler bolt torque values and sequencing. The event had no effect on public health and safety.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

Note: The Energy Industry Identification System Codes are identified within brackets { }

DESCRIPTION OF EVENT

On June 10, 2005, at approximately 0924 hours, while at 100% steady state reactor power, a manual reactor trip (RT) was initiated after discovery of water in the main generator exciter (TL) enclosure. All control rods {AA} fully inserted and all required safety systems functioned properly. The plant was stabilized in hot standby with decay heat being removed by the main condenser {SG}. There was no radiation release. The Emergency Diesel Generators {EK} did not start as offsite power remained available. The Auxiliary Feedwater System (AFW) {BA} automatically started as expected due to Steam Generator (SG) shrink effect. On June 10, 2005, at 0957 hours, a 4-hour non-emergency notification was made to the NRC for an actuation of the reactor protection system {JC} while critical (Event Log # 41762). The event was recorded in the IPEC corrective action program (CAP) as CR-IP3-2005-03054.

During the cycle 13 refueling outage, preventive maintenance (PM) activities were initiated on March 28, 2005, on the main generator (MG) {TB} exciter {EXC} coolers {CLR}. The exciter cooler units are air to water heat exchangers {HX} using plant service water (SW) {KG} to remove heat generated within the exciter. A fan unit at the end of the exciter circulates cooling air through the exciter cooler units. The 31A and B and the 32A and B Exciter Air Coolers were disassembled, cleaned, inspected and reassembled under Work Orders and maintenance procedure HTX-010-MTG," Main Turbine Generator Exciter Air Cooler Maintenance." During assembly of the coolers, 1/16 inch thick Garlock Viton gasket material was installed using an approved sealant (RTV) on both gasket surfaces. On April 4, after PM activities were completed, and post work testing (PWT) performed, all eight heads/chambers of the coolers were found to leak. Attempts were made to tighten bolting and stop the leakage which was successful on four of the eight cooler heads/chambers. The remaining four cooler head/chambers were removed, surfaces cleaned and the existing 1/16 inch gasket material substituted with 1/8 inch Viton rubber gasket material. The maintenance supervisor verified 1/8 inch gasket material was included in the procedure and concluded it was an approved substitute for the 1/16 inch gasket material. The maintenance supervisor conferred with Engineering, who concurred with the use of the 1/8 inch gasket material based on its inclusion in the procedure. The procedure owner who revised the procedure to include the 1/8 inch gasket material noted that when the 1/8 inch gasket material was added, the intention was for its use on pipe flange material. All four water heads/chambers were reinstalled with 1/8 inch thick Viton gasket material and RTV sealant. A PWT was re-performed which revealed several leaks on the re-worked coolers. Maintenance tightened the bolting where leaks were localized rather than tightening all of the bolts in an even pattern similar to what was done during initial installation. Maintenance found that two of the four water heads/chambers continued to have leaks. The two leaking heat exchanger heads/chambers were removed.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

The maintenance supervisor sought out and found 1/16 inch Viton gasket material. The two heads/chambers were reinstalled using the 1/16" gasket material and a 3M spray adhesive was applied to the heads/chambers to help hold the gaskets in place and facilitate the installation of the heads/chambers. Subsequent testing identified no leaks and the unit was returned to service. On June 5, 2005, after a SW header swap, water was discovered on the floor underneath the exciter. The area was cleaned and monitored with no further moisture noted. The condition was recorded in the CAP as CR-IP3-2005-02976 and assigned to engineering for evaluation. On June 10, 2005, water was discovered on the floor beneath the main turbine-generator and reported to a Nuclear Plant Operator (NPO). The NPO reported the water leak condition to the control room (CR). Operations investigation of the water leak lead to the exciter enclosure on the main turbine-generator operating floor (NM). Upon opening the exciter enclosure with the shift manager (SM) present, SW leakage was observed inside the exciter. The SM returned to the CR and initiated a manual reactor trip and isolation of SW to the exciter coolers to protect the exciter electrical components.

After the RT, an inspection was performed on the exciter coolers. The 32B inlet head/chamber was found to be leaking at the lower right corner of the head/chamber to tube sheet gasket interface and was tagged out for repair. The gasket was found to be split in the area of the seating surface. The split was observed to have a thin layer of cured RTV. The gasket material was determined to be 1/8 inch Viton. An extent of condition (EOC) inspection of the other seven cooler heads/chambers was initiated and repairs made as necessary. During the PWT for cooler heads/chambers, minor leakage was noted on the 32A reversing head/chamber. When the head/chamber was removed, the gasket was found to be displaced out of its seating area. Repairs were performed and a second PWT was completed with no leaks and the unit returned to service.

An EOC review was performed of other heat exchangers of similar channel head design. The other coolers include the Unit 2 and 3 containment Fan Cooler Unit (FCU) heat exchangers and FCU motor heat exchangers, the Main Generator Hydrogen Coolers, and the Iso-phase Bus heat exchangers. The Unit 2 generator does not have exciter coolers. The FCUs have external leak paths, were treated as Class A material with Class A procedures, inspected regularly and have not shown any leakage. Any leakage would be self revealing and not pose a reliability concern. Of the other coolers of similar design only the Unit 3 exciter coolers and the Unit 3 Hydrogen Coolers pose a similar potential reliability issue. All the other coolers of similar design have an external leak path should the gasket leak. The Unit 3 Hydrogen Coolers were installed by Siemens/Westinghouse using their approved materials and installation guidance and are not expected to leak. The Iso-phase Bus Heat Exchangers are the only other heat exchanger of similar design that can leak internally. However, they are designed to channel water leakage away from the air flow and into drip pans and drains. Cooler leak alarms also are provided for the Iso-phase Bus Heat Exchangers to alert operators of leakage.

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CAUSE OF EVENT

The cause of the manual RT was a conservative operational decision not to continue exciter operation with SW leakage in order to prevent damage to exciter electrical components. Direct cause of the SW leakage was a split gasket due to localized over tightening of the 32B inlet exciter cooler heads/chambers bolting. An independent assessment by an industry expert determined that the gasket on the 32B inlet head/chamber had been over compressed causing a crack in the gasket material. The root cause of the SW leak was the level and extent of training associated with resilient gasketed joint installation which did not encompass the effects of an improper tightening sequence during the test phase for return to service. Training was limited to basic gasket joint makeup and did not address post work repairs. Maintenance re-tightened bolting where leaks were identified but did not tighten the bolts in an even pattern as was done during re-installation. In addition, inspection of other cooler heads/chambers identified a displaced/extruded gasket on the 32A cooler reversing head/chamber mating surfaces which could have lead to further leakage. The displacement of the 32A reversing head/chamber gasket was determined to be caused by improper use of RTV sealant. The cause of this condition was the procedural allowed use of an approved sealant (RTV) in lieu of the original equipment manufacturers specified use of cement as an adhesive. Significant contributing causes were as follows: CC-1: Uneven mating surface of the joint between the exciter cooler head/chamber and tube sheet. The self-leveling epoxy that was applied manually created minor flatness deviations within the mating surface, CC-2: Workmanship related to RTV sealant application and gasket cutting.

CORRECTIVE ACTIONS

The following corrective actions have been or will be performed under the CAP to address the causes of this event:

- Performed repairs to applicable exciter cooler head/chamber utilizing 1/16 inch EPDM gasket material and Permatex 2 (non-hardening) on gasket surfaces. Post work testing was performed and the units returned to service.
- Maintenance personnel were briefed on the event and counseled on management's expectation of a questioning attitude, self checking, and workmanship quality.
- An Engineering Request (ER) will be processed to determine the appropriate torque values to be used for the Unit 3 exciter coolers, the Unit 2 and 3 hydrogen coolers and the Unit 2 and 3 Iso-phase heat exchangers, and the proper heat exchanger gasket material, adhesive, gasket seating surface flatness to be used..

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- The applicable Heat Exchanger Maintenance procedures will be revised to add the proper torque values and bolting sequence for cooler head/chamber installation, addition of steps for inspection of gasket seating surfaces and addition of the proper gasket adhesive and material to the Bill of Material section. Procedure revision is scheduled to be completed by October 31, 2005.
- The maintenance training program will be reviewed for adequacy in addressing proper resilient gasketed joint installation. Any necessary training program enhancements identified in the review will be completed by December 5, 2005

EVENT ANALYSIS

The event is reportable under 10CFR50.73(a)(2)(iv)(A). The licensee shall report any event or condition that resulted in manual or automatic actuation of any of the systems listed under 10CFR50.73(a)(2)(iv)(B). Systems to which the requirements of 10CFR50.73(a)(2)(iv)(A) apply for this event include the reactor protection system (RPS) including RT and AFWS actuation.

This event meets the reporting criteria because the RPS was manually actuated by operators and there was a valid AFWS actuation as a result of SG shrink effect.

PAST SIMILAR EVENTS

A review was performed of the past three years of Licensee Event Reports (LERs) for events that involved a RT caused by MG support systems failures. LER-2003-002 reported a manual RT as a result of a fire on the high pressure turbine insulation. The fire was a result of lubricating oil that had leaked from an oil deflector for the high pressure turbine (bearing # 2). The oil deflector was improperly assembled with no gasket on the top half and a gasket on the bottom half. Oil leaked onto insulation and ignited from the heat of the turbine casing. The cause of the event was human error in installing the oil deflector gasket. The event is similar since it involves improper installation of gaskets. Corrective actions for LER-2003-002 would not have prevented this event because this event was not a failure to install a gasket but use of an alternative sealant and inadequate torque sequencing.

SAFETY SIGNIFICANCE

This event had no effect on the health and safety of the public.
There were no actual safety consequences for the event because the event was an uncomplicated RT with no other transients or accidents. Required safety systems performed as designed when the RT was initiated. Following the RT, the plant was stabilized in hot standby. Actuation of the AFWS is an expected reaction to full power reactor trips due to SG shrink effect. Had water caused an electrical failure in the exciter, generator protection would have tripped the generator resulting in turbine trip and subsequent automatic RT.